PROC. ENTOMOL. SOC. WASH.
85(1), 1983, pp. 26–31

SEASONAL HISTORY AND HOST PLANTS OF THE PLANT BUG *LYGOCORIS ATRINOTATUS,* WITH DESCRIPTION OF THE FIFTH-INSTAR NYMPH (HEMIPTERA: MIRIDAE)

A. G. Wheeler, Jr. and Thomas J. Henry

(AGW) Bureau of Plant Industry, Pennsylvania Department of Agriculture, Harrisburg, Pennsylvania 17110; (TJH) Systematic Entomology Laboratory, IIBIII, Agricultural Research Service, USDA, ℅ National Museum of Natural History, Washington, D.C. 20560.

Abstract.—The plant bug, *Lygocoris atrinotatus* (Knight), is shown to develop on native and cultivated *Hydrangea arborescens* L. (Saxifragaceae), the first host association for this little-known mirid. The seasonal history is summarized for a western Pennsylvania population occurring on the cultivar 'Annabelle,' and known distribution is reviewed and mapped. An adult diagnosis and a description and illustration of the fifth-instar nymph are provided.

The biology of the plant bug genus *Lygocoris* Reuter is well known compared to that of many other mirid genera, with host plants recorded for all but a few North American species. One poorly known species is *L. atrinotatus* (Knight), described in the genus *Lygus* Hahn by Knight (1917). The holotype and allotype were from Pittsburgh, Pa.; paratypes (single males) were from Black Mountains, N.C. and Washington, D.C. Watson (1928) has since added Ohio to the known distribution, stating that the typical habitat was "along streams"; Henry and Smith (1979) also recorded it from Georgia. In the latest review of the genus, Kelton (1971) noted that the host was unknown.

In reporting *Lygocoris knighti* Kelton from *Viburnum recognitum* Fernald in New York and Pennsylvania, Wheeler (1980) included records from North Carolina and West Virginia based on females collected from *Hydrangea arborescens* L. The later discovery of a large *Lygocoris* population on hydrangea in Pennsylvania has enabled us to associate *L. atrinotatus* with its proper host plant, *H. arborescens* (Saxifragaceae), and refer the North Carolina and West Virginia records to this species. In this paper we review the known distribution, provide the first host association, summarize the seasonal history on cultivated hydrangea, and give a diagnosis of the adult and a description and illustration of the fifth-instar nymph.

Distribution

The following represent new state records based on specimens in the National Museum of Natural History, Washington, D.C. (USNM) collection: SOUTH CAROLINA: Rocky Bottom, July 31, 1934, J. M. Todd. TENNESSEE: Cades Cove, Great Smoky Mountains National Park, June 13, 1946, R. R. Dreisbach.

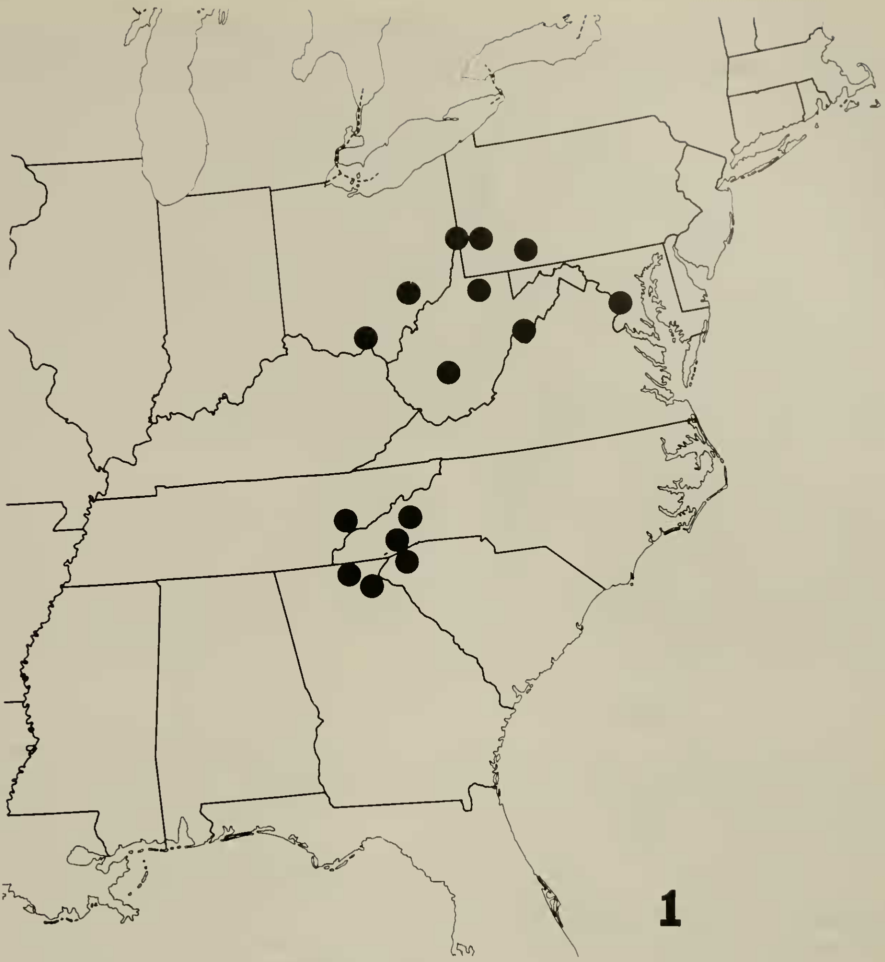


Fig. 1. Distribution of *Lygocoris atrinotatus.*

Watson's (1928) record of *L. atrinotatus* from Ohio apparently was based on Ohio Biological Survey material from Morgan Co., June 24, 1927, and Scioto Co., June 20, 1927 (Ohio State Univ. collection). The Union Co., Georgia record listed by Henry and Smith (1979) is based on a specimen in the University of Georgia collection: Neel Gap, July 5, 1947, P. W. Fattig. Additional Georgia records, based on USNM specimens, are from Clarksville [Habersham Co.], July 19, 1947, P. W. Fattig, and Sarah [Union Co.], July 7, 1945, P. W. Fattig. An additional Pennsylvania record, the site of our seasonal history observations, is Somerset Co., Davidsville, July 5, 1980 and June–July 1981, A. G. Wheeler, Jr. and T. E. Wolf. Wheeler's (1980) records of *L. knighti* from near Brevard, North Carolina, and Hancock and Pendleton counties, West Virginia, should be referred to *L. atrinotatus.* Additional West Virginia records are Monongalia Co., Morgantown, July 16, and Nicholas Co., 10 mi. N. of Fayette Co. line, June 24, 1978, A. G. Wheeler, Jr. and T. L. Mason, Jr.

The known range of *L. atrinotatus* is essentially Appalachian, that is, roughly confined to an area bounded in the north by the margin of Pleistocene glaciation and in the south by the Fall Line (Barr, 1969). Blauch (1975) delineated this region as the Southern Appalachian Highlands. Many of the records are concentrated in the southern Appalachian Mountain area of southeastern Tennessee, northeastern Georgia, and western North and South Carolina (Fig. 1). *Lygocoris atrinotatus* may have originated in the Great Smoky-Blue Ridge Mountain region of the southern Appalachians. This region harbors an interesting fauna that includes many endemic species. In a recent symposium this area was recognized as an important center of distribution, and specialists analyzed the distributional history of several invertebrate groups characteristic of the region (Holt, 1969). *Lygocoris atrinotatus,* based on limited collecting, ranges farther south than *L. knighti,* a closely related, viburnum-feeding mirid known from the Lake of the Woods region of southwestern Ontario, Tompkins Co. in south central New York, and Dauphin Co. in south central Pennsylvania.

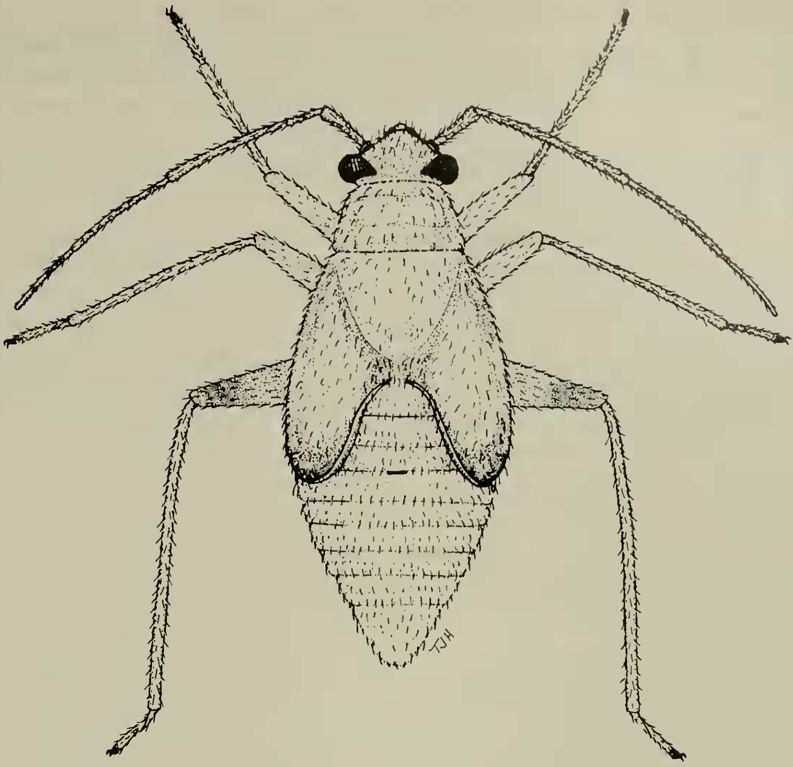
Species of *Lygocoris* overwinter as eggs inserted in woody tissue of host trees and shrubs; this habit allows mirids to move easily in shipments of nursery stock (Wheeler and Henry, 1974). Because both *L. atrinotatus* and *L. knighti* develop on plants used in horticultural trade, the movement of ornamental plants may introduce these mirids to new areas, thus blurring the current distinctness in their known ranges. It is possible that some such movement already has taken place.

Host Plants and Seasonal History

The first host records for *L. atrinotatus* became available in 1979 when this mirid was taken on inflorescences of native *Hydrangea arborescens* in North Carolina and West Virginia. Wild hydrangea is a much-branched, often straggling, shrub of the family Saxifragaceae, occurring on rocky slopes and stream banks from southern New York south to Georgia and west to Arkansas (Gleason and Cronquist, 1963). Sevenbark, another common name, refers to the tendency for bark on older stems to exfoliate. *Hydrangea arborescens* ssp. *radiata* is considered an Appalachian endemic (Cooper and Hardin, 1970).

In 1980 we found *L. atrinotatus* on cultivated *H. arborescens* in a nursery in Somerset Co., Pennsylvania. Large numbers were present on the cultivar 'Annabelle,' a plant selected at the University of Illinois for its large flower clusters or corymbs (Dirr, 1977). We have not encountered this mirid on the Asiatic *H. paniculata* Siebold or its commonly planted cultivar 'Grandiflora,' the peegee hydrangea.

On 5 July 1980 at the nursery in western Pennsylvania, adults were abundant on flower clusters along with a few fifth-instar nymphs. Periodic samples were taken from two large *H. arborescens* 'Annabelle' in 1981 to obtain information on phenology. Overwintering eggs began to hatch during late May when flower buds were small and tightly closed. A random sample of 11 nymphs collected on 5 June contained second and third instars with only single specimens of instars I and IV. One week later when flower buds were still tightly closed, instars III–V were found in equal numbers (five specimens each), with one second instar present. By 19 June a collection of 20 specimens contained one third, three fourth, and ten fifth instars and six adults (4 ♂, 2 ♀). Adults of this univoltine mirid were



2

Fig. 2. *Lygocoris atrinotatus*, fifth instar.

most common during early bloom of *H. arborescens* (late June–early July) and began to decline in numbers by mid-July.

Most species of *Lygocoris* are oligophagous or monophagous and, as Leston (1952) noted, the North American species, even more so than the Old World *Lygocoris* fauna, have developed a specificity for various deciduous trees. *Lygocoris atrinotatus* is a specialist on shrubs of the genus *Hydrangea* on which nymphs feed exclusively on the developing flower buds and later on the opened inflorescences. Inflorescences of many plant species are available only briefly each season, and flower-feeding insects sometimes must utilize other resources to complete their development. Adults of *L. atrinotatus,* however, appear well before full bloom of *H. arborescens* so that no resource switching, e.g. to vegetative tissue, appears necessary.

DESCRIPTIONS OF ADULT AND FIFTH-INSTAR NYMPH

Adult male.—Length 5.42–5.83 mm ($\bar{x} = 5.48$ mm, $n = 4$). Head testaceous, apex of tylus fuscous. Antenna fuscous, except for pale 1st segment. Rostrum reaching middle of metacoxa. Pronotum testaceous with a large, quadrate, fuscous spot behind each callus. Scutellum uniformly testaceous. Hemelytron testaceous with clavus, except lighter brown median line and apical ⅓ of corium and embolium, fuscous; membrane fumate, veins pale testaceous. Venter testaceous to greenish yellow, sides of thorax and abdomen and genital segment fuscous. Legs testaceous; metafemur infuscated on apical ½; tibial spines brown without distinct spots at bases.

Adult female.—Length 5.33–5.83 mm ($\bar{x}$ = 5.64 mm, n = 7). Similar to male in color and general appearance.

Remarks.—Adults of *L. atrinotatus* are very similar to *knighti* in general appearance, but *atrinotatus* can be separated by the pale first antennal segment (rather than fuscous) and by the much larger and more distinct quadrate spot behind each callus. Male genitalia are quite distinct. In *atrinotatus* the left paramere is typically L-shaped without lateral processes, and the right paramere has the apical arm curved downward and perpendicular to the base; in *knighti,* the left paramere has two lateral processes, and the apical arm of the right paramere is directed upward and parallel to the base. Kelton (1971) figured the parameres for *knighti,* and Knight (1917) figured them for *atrinotatus. Lygocoris atrinotatus* is also similar to *L. canadensis* var. *binotatus* Knight in having large quadrate spots behind the calli, but the genital parameres of the variety *binotatus* are of the same form as *canadensis* Knight and more similar to *knighti* than to *atrinotatus.*

Fifth-instar nymph (Fig. 2).—Length 3.75–4.17 mm ($\bar{x}$ = 4.06 mm, n = 6). General coloration creamy white with head, anterior ½ of pronotum, and middle of abdominal terga tinged with green. Wing pads pallid with interior margins, outer basal margins, and apices infuscated; claws and apices of tarsi fuscous; apical ½ of metafemur infuscated. Antennal segments II–IV and tibiae sometimes more testaceous. Entire dorsum and appendages sparsely clothed with short, recumbent, dark-brown setae.

ACKNOWLEDGMENTS

We are grateful to T. E. Wolf (Pennsylvania Department of Agriculture, Altoona) for his help in sampling *L. atrinotatus.* Linda Butler (Department of Entomology, West Virginia University, Morgantown) and C. A. Triplehorn (Department of Entomology, Ohio State University, Columbus) kindly lent specimens from collections in their care. We also thank C. L. Smith (Department of Entomology, University of Georgia, Athens) for supplying data from a Georgia specimen, and E. R. Hoebeke (Department of Entomology, Cornell University, Ithaca, New York) for reading the manuscript.

LITERATURE CITED

Barr, T. C., Jr. 1969. Evolution of the (Coleoptera) Carabidae in the southern Appalachians. Pp. 67–92. *In* Holt, P. C., ed., The distributional history of the biota of the southern Appalachians. Part I: Invertebrates. Va. Polytech. Inst. Res. Div. Monogr. 1.

Blauch, D. S. 1975. Toward a natural delineation of the area known as the southern Appalachian Highlands. Castanea 40: 197–201.

Cooper, A. W. and J. W. Hardin. 1970. Floristics and vegetation of the gorges on the southern Blue Ridge escarpment. Pp. 291–330. *In* Holt, P. C., ed., The distributional history of the biota of the southern Appalachians. Part II: Flora. Va. Polytech. Inst. Res. Div. Monogr. 2.

Dirr, M. A. 1977. Manual of woody landscape plants: Their identification, ornamental characteristics, culture, propagation and uses. Stipes Publishing Co., Champaign, Ill. 536 pp.

Gleason, H. A. and A. Cronquist. 1963. Manual of vascular plants of northeastern United States and adjacent Canada. D. Van Nostrand Co., Princeton, N.J. 810 pp.

Henry, T. J. and C. L. Smith. 1979. An annotated list of the Miridae of Georgia (Hemiptera-Heteroptera). J. Ga. Entomol. Soc. 14: 212–220.

Holt, P. C., ed. 1969. The distributional history of the southern Appalachians. Part I: Invertebrates. Va. Polytech. Inst. Res. Div. Monogr. 1: 1–295.

Kelton, L. A. 1971. Review of *Lygocoris* species found in Canada and Alaska (Heteroptera: Miridae). Mem. Entomol. Soc. Can. 83: 1–87.

Knight, H. H. 1917. A revision of the genus *Lygus* as it occurs in America north of Mexico, with biological data on the species from New York. Cornell Univ. Agric. Exp. Stn. Bull. 391: 555–645.

Leston, D. 1952. On certain subgenera of *Lygus* Hahn 1833 (Hem., Miridae), with a review of the British species. Entomol. Gaz. 3: 213–230.

Watson, S. A. 1928. The Miridae of Ohio. Ohio Biol. Surv. Bull. 16: 1–44.

Wheeler, A. G., Jr. 1980. First United States records of *Lygocoris knighti* (Hemiptera: Miridae). Entomol. News 91: 25–26.

Wheeler, A. G., Jr. and T. J. Henry. 1974. *Tropidosteptes pacificus,* a western ash plant bug introduced into Pennsylvania with nursery stock (Hemiptera: Miridae). U.S. Dep. Agric. Coop. Econ. Insect Rep. 24(30): 588–589.